FINDINGS FROM THE SURVEY OF PARTICIPANTS OF THE 19TH ANNUAL NATIONAL CONFERENCE OF BLACK PHYSICS STUDENTS

Report prepared by:
Julius Dollison
and
Michael Neuschatz

Statistical Research Center
American Institute of Physics
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INTRODUCTION

On the weekend of February 3rd - 6th, the University of Chicago and Argonne National Laboratory in Illinois hosted the 2005 National Conference of Black Physics Students (**NCBPS**). This marks the 19th consecutive year that the Conference has provided African American physics students the unique opportunity to meet and network with counterparts from all across the nation, and with minority and non-minority professional physicists. Also in attendance were graduate school and corporate recruiters, administrators, faculty members, and various professional society representatives. As has been the case for over a decade, the Conference organizers contracted with the Statistical Research Center of the American Institute of Physics to conduct an evaluative study of the meeting.

The survey instrument, as in previous years, covered the personal and academic background of the student participants, current as well as future academic objectives, and specific goals in attending the Conference. Students were also queried on their assessment of the content and organization of the conference sessions, both research talks and career advisory panels, as well as the practical arrangements such as travel and lodging. Additional items probed the students' feelings about their decision to major in physics, as well as obtaining an assessment of their academic experiences to date.

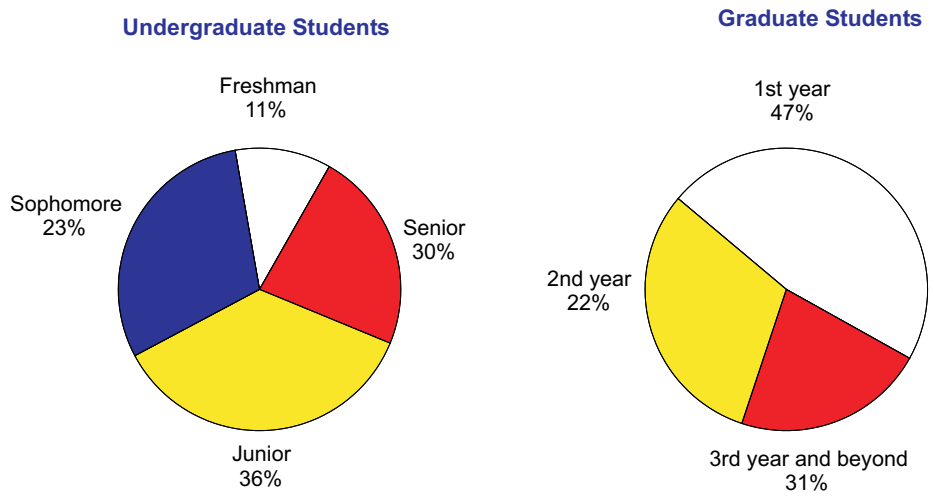
The four page questionnaire was designed by the Statistical Research Center's evaluators in close consultation with the Conference organizers, and was structured to allow for comparisons with the responses of attendees from previous years. The questionnaire was distributed at the beginning of the Conference, and collected on the last night. Of the 153 students who attended the Conference, 106 (69%) returned a completed questionnaire, an increase over last year's response rate.

DEMOGRAPHIC BACKGROUND OF ATTENDEES

As has been the case since the inception of the Conference, undergraduate student participants greatly outnumbered the graduate student participants, by a margin this year of 2 to 1. The undergraduate students tended to be concentrated at the upper-end of their levels, which is not very surprising given the fact that many undergraduates don't declare their majors until the end of their sophomore year. In contrast, around half of the graduate attendees were in their first year of graduate study (**Figure 1**). A strong indicator of the organizer's success in recruiting students is that, despite these tendencies, there is still significant representation across all stages of the physics academic pipeline.

The overall median age at this year's Conference was 21 years. The median age for undergraduate student participants was 20, while for graduate student participants it was 25 years, lower than in years past (**Figure 2**). Controlling for level of study, we found that there was very little age difference among the male and female undergraduate students. The median age for male undergraduates was 21 years, while for female undergraduates it was 20 years. Whereas in years

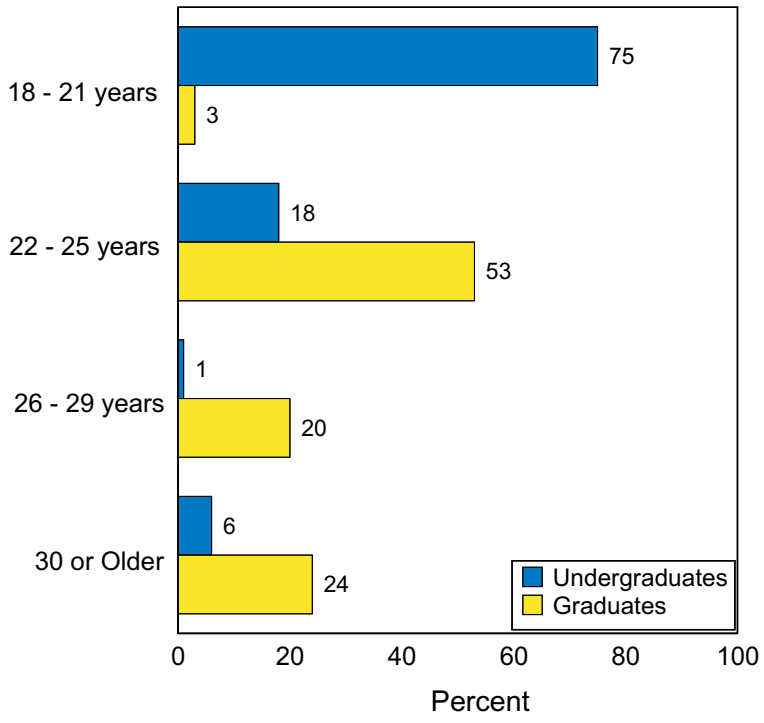
Figure 1. Class standing of the NCBPS attendees, 2005.



past we found marked differences in the ages of male and female graduate students, this year the median age among both groups at the Conference was identical.

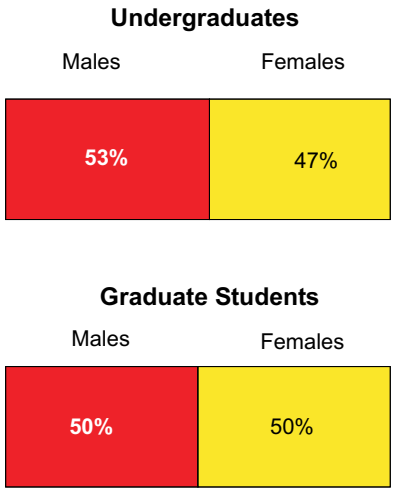
Women were, once again, well represented at this year's NCBPS Conference. The overall proportion of female respondents was 47%, significantly higher than last year's 35%.

Figure 2. Age by degree of the NCBPS attendees, 2005.



Among undergraduates, the number of women was 47%, while among graduate students the proportion was evenly distributed between males and females (**Figure 3**). This is unusual in a discipline like physics, where female students have traditionally been underrepresented, especially at the graduate level.

Figure 3. Sex by student status of the NCBPS attendees, 2005.



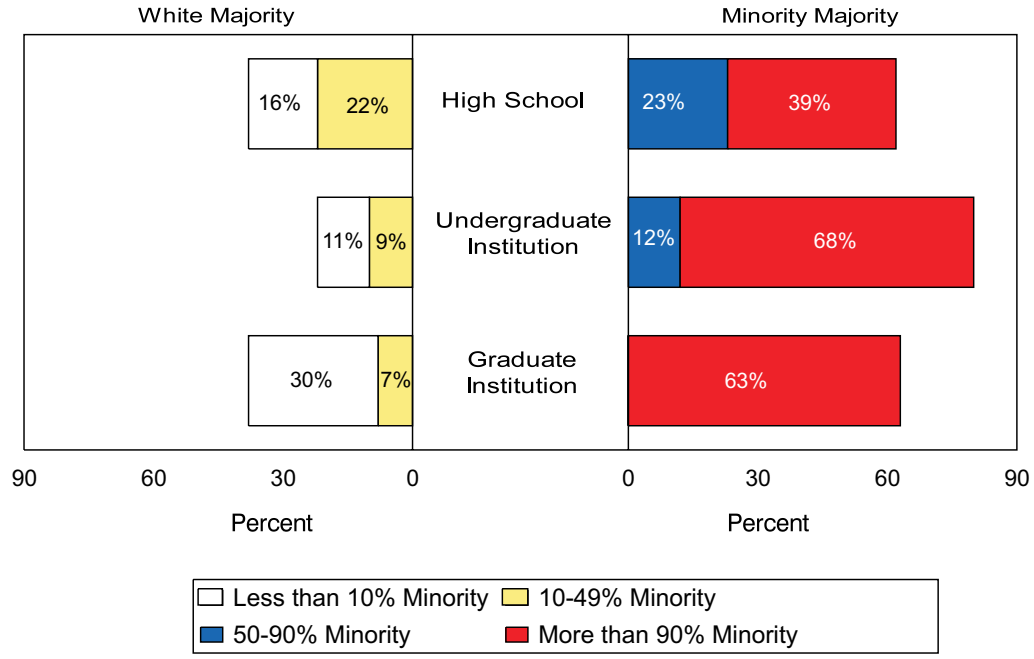
For the first time this year, participants were queried on their citizenship status. While the overwhelming majority indicated that they were US citizens, almost one-fifth turned out to be foreign students. The foreign students were asked what region of the world they were from, and here we found that the two regions most heavily represented were Africa and the Carribean (**Table 1**).

Conference attendees were probed on the minority composition of the high school they attended, of their undergraduate institution, and where applicable, of their graduate institution (**Figure 4**). As was true for past conferences, most students came from minority-majority schools. We found that almost two-thirds of the respondents had attended minority-majority high schools, and most of these came from essentially all majority high schools. And like last year, an even higher proportion (80%) of all attendees reported going, or having gone, to an Historically Black College or University (**HBCU**) or minority-majority institution for

Table 1. Citizenship of NCBPS participants, 2005.

	Percent %
US Citizens	82
Foreign Citizens	
Africa	8
Caribbean	8
Europe	2
	100%

Figure 4. Minority composition at respondents' high school, undergraduate, and graduate institution, 2005.



their undergraduate studies. Not surprisingly, given the fact that there are fewer **HBCU**s that offer physics at the graduate level, this declined somewhat among graduate students, although even here close to two-thirds of all graduate participants were attending minority-majority institutions.

Different patterns emerged, however, for males and females, patterns that have been repeated for years and whose explanation is not fully clear. The most curious of these has been that, consistantly, a higher proportion of female than male student participants at the **NCBPS** come from relatively integrated high schools, but then gravitate towards minority-majority colleges and universities.

Although many of the Conference participants had attended previous **NCBPS** meetings, more than half of the undergraduate and around a third of the graduate students this year were new to the Conference. And while in previous years there was a very high proportion of students coming from a relatively small set of schools concentrated in the South, this year that percentage was significantly lower (76% versus 88% last year). Finally, there were also students from colleges that had not been previously represented.

PHYSICS & SCIENCE BACKGROUND

Conference participants were probed about their current academic studies, including their evaluation of the courses and professors they had encountered during their scholastic careers. As in the past, the Conference drew only a small number of students (16%) who weren't majoring in physics, and more than a third of

Table 2. Minority composition at respondents' high school, college and graduate institution, 2005.				
	Undergrad Males %	**Undergrad Females %**	**Grad Males %**	**Grad Females %**
White majority high school	38	47	25	31
Minority majority high school	62	53	75	67
White majority college	28	9	25	12
Minority majority college	72	91	75	88
White majority graduate school	-	-	50	21
Minority majority graduate school	-	-	50	79

those were in engineering. The high degree of satisfaction with their chosen field of study is reflected by the proportion of physics students (89%) who reported that given what they now know, they would still major in physics if they had it to do over again. Along similar lines, we found that a large majority of the respondents (81%) felt that their physics course work would provide a solid background for their future careers, and just as many (82%) reported that in general the professors they had encountered had been supportive and helpful to them.

Even when we controlled for gender and level of study, we found very small differences in the attitudes of the participants (**Figure 5**). As was also the case in previous years, male attendees were more likely to say they would major in physics if they had to do it over again (95% versus 82% for women). They were also somewhat more likely than their female counterparts to feel that their physics course work would provide a solid background for their future careers (87% versus 74%). And not surprisingly, given their more advanced status, graduate student participants were more likely than their undergraduate counterparts to feel that their physics course work would provide a solid background for their future careers (91% versus 77% for undergraduate respondents). They were also somewhat more positive about the professors they had encountered than were the undergraduate respondents (88% versus 80%).

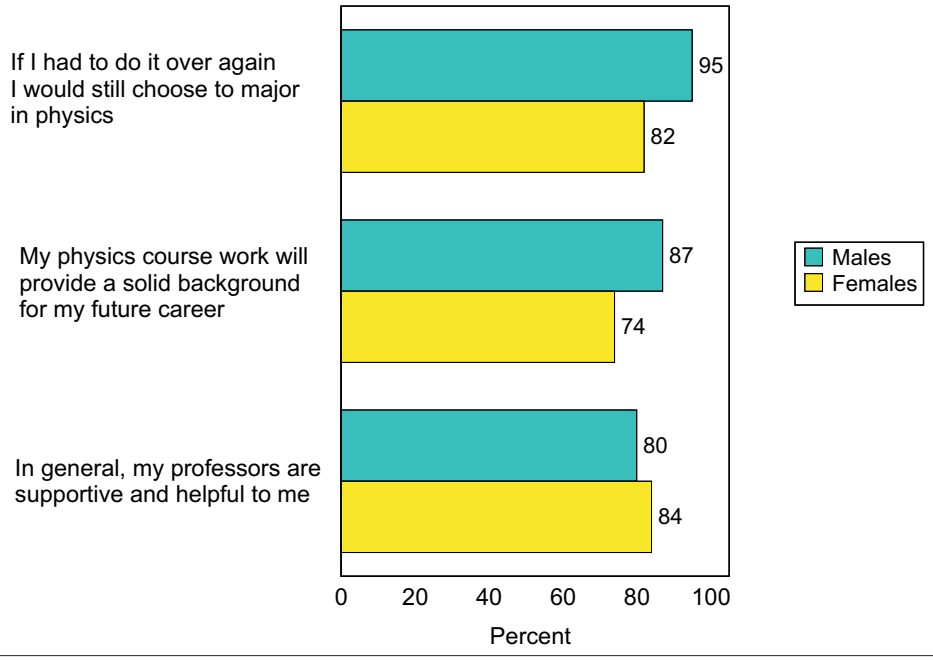
More detailed examination of the data revealed additional findings of interest. For instance, female undergraduate students were the least likely to want to major in physics again if they had it to do over (79% versus 95% for male undergraduate students and 91% for graduate students). Not surprisingly, given how they feel about majoring in physics again, they were also the least likely of all the groups to feel that their course work would provide a solid background

for their future careers. We also found that a greater proportion of non-HBCU students reported that they would major in physics if they had it to do over again (96% versus 86% for HBCU students). But again, despite these small differences, the widespread satisfaction of NCBPS participants with physics and their academic experiences so far is quite evident in these generally high numbers.

A large majority of attendees indicated that they already had some type of research experience in physics. As expected, this was true for virtually all of the graduate students (**Figure 6**). This was also true, surprisingly, for around two-thirds of the undergraduate participants. Moreover, this was not just confined to on-campus activities. We also found that half of this year's graduate students and around one-quarter of the undergraduates reported that they had an off-campus position or internship that included a physics research component. Graduate students, not surprisingly, were more likely than undergraduates to have engaged in research as part of a physics course. They were also more likely to have been a research assistant to a professor.

Students at non-HBCU schools are in general slightly more likely to have had some sort of research experience. They were especially more likely than their HBCU counterparts, to have engaged in research as part of a course (52% versus 28%). Interestingly, female undergraduate participants were the least likely to have had any research experience in physics (53% versus 77% for male undergraduates and 94% for graduate students of both sexes). Along similar lines, they were also less likely than any other group at the conference to have been a research assistant for a professor (32% versus 54% for male undergraduate students and 56%

Figure 5. Extent to which NCBPS particpants agree with the following statements, 2005.

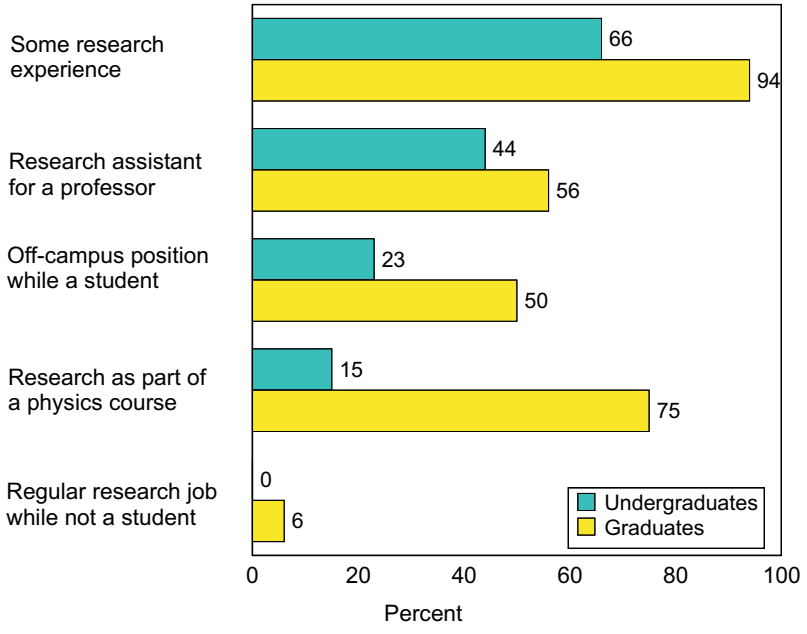


for graduate student participants of both sexes). On the other hand, male graduate students at the conference were the only group to report having a regular research job while not a student.

Conference participants were asked to provide us with data concerning their participation in nationally-sponsored internship programs. Less than half of the Conference attendees (40%) reported having participated in any nationally-sponsored internship program. The most popular program, chosen by one-fifth of the respondents, was with NSF - Research Experiences for Undergraduates (REU). The second most popular program was the DOE Summer internship program chosen by slightly less than an eighth of the Conference participants (but over a third of the graduate students), closely followed by the NASA - Undergraduate Student Research Program (USRP). Further down were the NSF - Louis Stokes Alliance for Minority Participants and the DOD summer internship program, each involving less than one in 20 of the NCBPS participants. The students were also asked if they were planning on participating this summer with any of the aforementioned programs, and almost one-quarter of them indicated that they were scheduled to participate with one of these programs in the summer of 2005.

For the first time this year, Conference participants were asked whether they had a designated faculty advisor or mentor and, if they didn't, whether or not they were actively looking for one. Not surprisingly, the majority of respondents (86%) indicated that they had a faculty advisor or mentor. Of those that didn't have an advisor, more than half of them (60%) were planning on actively looking for one. Quite unexpectedly, female graduate participants were found to be the least likely to have a designated faculty advisor or mentor (69% versus 94% for male graduate students and

Figure 6. Proportion of undergraduate and graduate attendees reporting different types of physics research, 2005.



89% for undergraduates of both sexes). The reason for this is not readily apparent, but it represents a place where timely intervention might help to ensure more effective guidance for students.

ACADEMIC GOALS & CAREER ASPIRATIONS

NCBPS participants were probed in detail about their future aspirations and career objectives. Regardless of their current level of study, virtually all of the respondents indicated a desire to obtain a graduate degree, with around 82% aspiring to a PhD. Slightly more than half of the students reported that they definitely wanted to pursue a career in physics, with another 35% reporting that they were considering going in that direction. Only 13% indicated definite plans to shift into another field altogether. It is worth noting that, in reality, only a fraction are likely to realize this goal. For instance, historically around one-quarter of physics bachelors of any race go on to a PhD, and among all those going on to graduate studies, half end up shifting to another field. So while encouraging academic aspirations is very desirable, it is equally important that realistic information be put in the student's hands so they know what is expected of graduate students.

Table 3 illustrates the different types of physics careers Conference participants were interested in pursuing. More than three-quarters of the participants hoped to make their careers in physics research or teaching, including 21% who indicated an interest in physics research but were unsure of the employment sector they preferred. Graduate students were more likely to favor careers in academe (28% versus 16%), while undergraduates were more likely to indicate an interest in careers in other sciences. Female undergraduate participants were the least likely of all the other groups at the conference to favor careers in government or national labs (6% versus 15% for male undergraduates and 16% for graduate

Table 3. NCBPS participants' anticipated career goals, 2005.

	Percent
Academic teaching or research in physics	21
Non-academic physics research in industry	22
Non-academic physics research in government / national labs	12
Physics research in unspecified employment sector	21
Other types of physics-related positions	10
Careers in other sciences	13
Careers outside of physics altogether	1
Total	100%

participants of both sexes), instead favoring careers in other, albeit related, fields (18% versus 8% for male undergraduates, and 6% for graduate males and females). Students at non-HBCUs were definitely more focused in on physics research in academe than were their HBCU counterparts, who tended to favor careers in science related fields.

Attendees were asked to indicate the motivation underlying their career goal choices (**Table 4**). As we found in times past, the most common reason, ranked by almost half of all respondents, was the intrinsic challenge of the work. The chance to give something back to the community came in second, and was up substantially compared to last year. In second place last year, salary and benefits came in third this time with far fewer participants choosing it as the most important factor for them. Interestingly, undergraduate students were far more focused on the intrinsic challenge of the work (52% versus 38% for graduate students), while graduate student attendees seemed to be more concerned with the need to give something back to the community.

Upon closer inspection we found that male graduate students were by far the most concerned with giving something back to the community (56% versus 31% for female graduate students and 32% for male and female undergraduates). They were also the least likely to stress the intrinsic challenge of the work (25% versus 50% for female graduate students and 52% for undergraduates of both sexes). They were also the only group not interested at all in the salary or benefits (0% versus 6% for female graduate students and 10% undergraduate students). While in the past we found that students at HBCUs were more concerned with giving something back to the community, this year this was of greater concern to non-HBCU students (44% versus 33% for HBCU students). On the other hand, more HBCU students pointed

Table 4. Main factor that led NCBPS participants to their choice of career goal, 2005.

	Undergrad Males %	Undergrad Females %	Grad Males %	Grad Females %	Overall %
Challenging or interesting work	59	44	25	50	47
Chance to give something back to the community	26	38	56	31	36
Salary and benefits	10	9	0	6	7
Respect people have for this type of work	5	6	6	6	6
Other	0	3	13	7	4
Total	100	100	100	100	100

to salary and benefits as being the main impetus for choosing their career goals (10% versus 0% for non-HBCU students).

Students were asked to provide us with the most important factors that helped them to persist in their physics studies (**Table 5**). Unlike in previous years where family support and love of subject matter were pretty closely ranked, this year, love of the subject matter clearly stood out as the most important factor. Family support came in second and career prospects came in third. At the same time, the proportion of students citing support from African American faculty members as most important has been steadily dropping from 21% two years ago, to 14% last year, and down to 9% this year.

These feelings, however, were not evenly distributed among participants. Far fewer male graduate students chose career prospects as a motivating factor (6% versus 19% for female graduate students and 18% for undergraduates). Male participants were more likely to stress love of the subject matter (43% versus 32% for females) and far less likely to cite family support (13% versus 30% for females). Students at HBCUs were more likely than their non-HBCU counterparts to choose peer support from other African American students (11% versus 0%) and family support (25% versus 8%). Conversely, non-HBCU students were more likely to stress love of the subject matter (56% versus 32%) and support from non- African American faculty members (12% versus 3%) as their motivating factor.

ASSESSMENT OF THE CONFERENCE

Besides presenting a profile of the student participants, their experiences in physics education, and their reasons for attending **NCBPS**, the survey also solicited their

Table 5. Factors that have helped NCBPS participants persist in their studies, 2005.

	Top Factor %	Among Top 3 %
Love of subject matter	38	74
Family support	21	54
Career prospects	17	50
Support from other Black students	9	46
Support from Black faculty members	9	40
Support from non-Black faculty members	5	21
Support from other non-Black students	1	8
Other	2	7
Total	100	

assessment of the Conference and its relevance to their needs. As part of the latter, participants were asked their specific objectives for attending and whether the Conference was effective in meeting those objectives.

As was also the case last year, networking with other African American physics students was the most important reason, cited as their primary motivation by more than a third of the respondents (**Table 6**). Learning about further study in physics, in third place last year, came in a close second this year with 28% of the students indicating this as their primary motivation. And in third place with around one-fifth of the students choosing it was networking with African American professionals.

These motivations varied greatly once again depending on where students were in their academic careers. Undergraduate students were far more interested in learning about further study in physics and meeting with school or job recruiters than their graduate counterparts. On the other hand, and not surprisingly, we found that graduate students were more focused on networking with African American professionals than undergraduates were. Also in line with expectations, we found that students at non-HBCUs were also more intent on networking with other African American physics students (33% versus 16% for HBCU students), while students at HBCUs seemed to be more interested in meeting with school or job recruiters. Networking with other African American physics students was more frequently cited by male participants than their female counterparts (47% versus 20% for females), whereas female participants seemed more focused on learning about further study in physics (36% versus 20% for males).

The overall assessment of the Conference further emphasizes the positive reaction that the participants displayed. While research was not uppermost in the minds of many participants, around three-quarters of them viewed all or most of the research talks as exceptional, and around that same proportion gave a similar ranking to the quality of the speakers (**Table 7**).

Table 6. Goals in attending NCBPS conference, 2005.

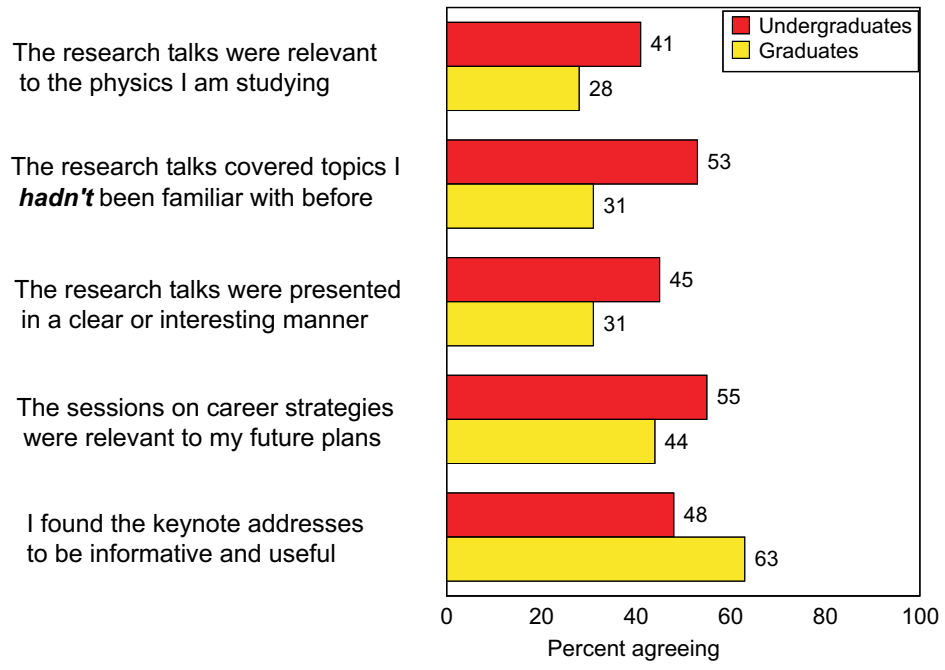
	Top Goal %	Among Top 3 %
Learning about further physics study	28	62
Networking with Black professionals	20	76
Networking with other Black students	34	78
Meeting with recruiters	16	57
Hearing research talks	1	23
Other	1	1
Total	100	

Table 7. Overall assessment of key aspects of the conference, 2005.					
	Proportion rated exceptional				
	All %	Most %	Half %	Few/None %	Total %
Content of research talks	22	51	22	5	100
Quality of speakers	25	50	21	4	100

Like last year, the sessions on career strategies and the keynote addresses were all given positive ratings by more than half of the Conference participants. This year, however, less than half of the students felt that almost all of the research talks were presented in a clear and interesting manner (**Figure 7**). Around a third of the respondents felt that the contents of the talks were directly relevant to the physics they were studying. And close to half of the students reported that many of the topics addressed during the research talks covered new ground for them.

Interestingly, we discovered that a greater proportion of the undergraduates students felt that the content of the research talks were directly relevant to the physics they were studying (41% versus 28% for graduate

Figure 7. Extent to which NCBPS participants agree with the following statements, 2005.



students). Not surprisingly, given that they are further along, graduate respondents were less likely to say that they were unfamiliar with the topics covered in the research talks (31% versus 53% for undergraduates).

Male respondents for the most part reported that many of the topics covered during the research talks were new ground for them (54% for males versus 50% for undergraduate females and only 13% for graduate females). Oddly, female graduate students were the one group that consistently expressed the least positive views about the content of the sessions. For example, only around one-third of them reported that the sessions on career strategies were relevant to their situation (37% versus 50% for male graduate participants and 55% for undergraduates). They were also the least likely to feel that all of the research talks were presented in a clear and interesting manner (13% versus 50% for male graduate students, 50% for female undergraduates, and 56% for male undergraduates). And while three-quarters of the male graduate students found the keynote addresses to be useful to their personal situation, only half of the female graduate students felt that way (along with less than half of the undergraduate students of both sexes).

Participants were also queried on the success of the Conference in fulfilling the various goals students had when they decided to attend. One measure of the Conference's effectiveness is that overall, every goal mentioned received an excellent or good rating by more than three-quarters of the respondents. This year the most highly rated aspects were the opportunity to learn about further study in physics and the ability to network with other minority physics students. Meeting with school or job recruiters came in third, with networking with minority professionals close behind, an improvement over last year (**Table 8**).

A very high proportion (97%) of the graduate student participants valued the opportunity to learn about further study in physics. However, they were less positive about the opportunity to network with minority professionals (78% versus 89% for undergraduates), and the opportunity of meeting with recruiters (75% versus 89% for undergraduates). Male students gave higher marks to hearing research talks and learning about further physics studies than their female counterparts. And not surprisingly, given their isolation from other minorities, all the students at non-HBCUs gave high ratings to the opportunity of networking with other minority physics students.

Table 8. Performance of the Conference in meeting goals, 2005.

	Excellent %	Good %	Fair %	Poor %
Learning about further physics study	50	42	7	1
Networking with other Black students	56	37	7	0
Networking with Black professionals	46	40	11	3
Meeting with recruiters	45	40	13	2
Hearing research talks	35	43	19	3

Participants were asked to rate the practical arrangements (i.e. travel arrangements, housing, length of sessions, geographical location, and the length of the Conference) of this year's **NCBPS** meeting (**Table 9**). Overall, students were a bit more critical of these logistical aspects of the conference than they had been in earlier years. Still, the vast majority of the students gave high ratings to each of these arrangements, with especially favorable verdicts for the travel arrangements and the overall length of the Conference. Only around two-thirds of the respondents ranked the housing facilities as good or excellent, and even fewer gave high marks for the length of the individual sessions. Not surprisingly, only slightly more than half of the students gave high marks for the location of the Conference, in that the majority of the sessions were held on the Argonne National Lab site which is situated in a very secluded area in Illinois. This sentiment was also often strongly expressed in the comments that students offered at the end of their surveys, and which is appended to this report.

CONCLUSION

Based on the findings and the verbatim comments we see that in most ways the Conference was quite successful in fulfilling its goals and meeting the expectations of the students. The content of the sessions, the keynote speakers, the opportunity to network with minority students and to learn about further study in physics all received exceptional ratings. Overall, the Conference continues to do its job of providing an opportunity for African American physics students to solidify a sense of community and to access tools that improve their chances of success in their academic and future career quest.

Table 9. Ratings of the practical arrangements at the Conference, 2005.

	Excellent %	Good %	Fair %	Poor %
Travel arrangements	62	23	14	1
Housing facilities	43	26	25	6
Length of sessions	19	42	33	6
Length of the Conference	39	45	13	3